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IN TWO SECTIONS

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EDITORIAL DEPARTMENT NOTE

In this issue of our Bulletin we are presenting to our members three papers which we think are of very great interest. The first one of these papers explains the accounting and office procedure of the Department of Highways of the State of Pennsylvania. Its main interest lies in the fact that it is a non-profit organization, handling many millions of dollars annually, and has an enormous investment in machinery and equipment with which it performs its functions of highway and bridge construction and maintenance through its central office and a great many branch offices. When it is realized that the money expended by highway departments throughout the country is derived directly or indirectly from taxes and licenses of various kinds, the importance of correct accounting records for their proper control is readily seen.

The author of this paper, Mr. Thos. D. Frye, after serving with the Standard Oil Company at Pittsburgh, Pennsylvania, for several years was appointed as assistant to the Chief Clerk of the Auditor General's department of the Commonwealth of Pennsylvania, for the purpose of installing accounting systems in that department.

After serving in various capacities in that department, he was appointed Deputy Secretary in the preparation of the first budget of the Commonwealth of Pennsylvania.

During 1923 he accepted the position as Controller of the Pennsylvania Department of Highways and later assumed the duties of the Office Director. Since 1925 he has held the positions of Office Director and Controller, also Deputy Secretary of Highways.

Mr. Frye is greatly interested in the work of the N. A. C. A. and is now first Vice-President of the Harrisburg Chapter.

The second paper, entitled, "Flexibility in Budgetary Control," is a very clear and interesting discussion of the principles underlying the variations in costs which accompany varying volumes of business activity. The treatment of the subject is logical and is well clarified by several excellent illustrations and tables.

Mr. Alden C. Brett, the author of this paper, received his B. S. degree from Massachusetts State College in 1912. For a time he was Field Agent for the Plymouth County Trust Company after which he was branch manager with J. Cushing & Company for quite a while. He became connected with the Hood Rubber Company in 1921 and was Internal Auditor of the company when he was made Controller two years ago. Mr. Brett has been actively interested in the Boston chapter of the N. A. C. A. for a long time. He was recently elected as Director of Membership for the chapter for 1932-1933.

The last paper is on a subject about which probably very little has been written. It treats of the losses resulting from imperfect products. whatever the cause. It will be especially interesting to our members in any branch of the knit goods industry as it is a discussion of the loss in "imperfects" in a hosiery mill.

Mr. Lloyd F. Mogel, the author of this paper, is a graduate of the Wharton School of Finance of the University of Pennsylvania. After working a year as a stenographer, he spent four years in the Production Scheduling and Planning Department of the International Money Machine Company. After five more years of cost and statistical experience in textiles with the Narrow Fabric Company he became Cost Accountant for the Princess Royal Hosiery Mills, which position he has held for the last six years. Mr. Mogel is Secretary of the Reading chapter of the N. A. C. A., before which he delivered this paper.

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NATIONAL ASSOCIATION OF
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ACCOUNTING AND OFFICE PROCEDURE OF THE PENNSYLVANIA DEPARTMENT OF HIGHWAYS

By Thomas D. Frye, Office Director and Controller, Pennsylvania Department of Highways, Harrisburg, Pa.

IN OUTLINING my talk to you I will confine my remarks to three main subjects; first, the size and scope of the Pennsylvania Department of Highways, second, fiscal control, and third, features of office management.

First, I want to correct the somewhat general erroneous impression that the Department of Highways has charge of the State Highway Patrol, and that it issues automobile tags, operators' licenses, certificates of title, and collects the highway revenues.

During 1929 these functions were transferred from the Department of Highways to the Department of Revenue, so that the Department of Highways now is a large road and bridge construction and maintenance organization.

We are responsible for approximately 33,500 miles of highways. Thirty-three thousand five hundred miles of highways is a huge mileage. It is equivalent to approximately twelve complete highways entirely across the United States. If our highways were placed lengthwise across the State of Pennsylvania, similar to the lines on a tablet, we would have the state covered with highways running parallel from east to west, and less than one and one-half miles apart. On this system of highways, we have approximately 18,000 bridges. The approximate total mileage of these bridges is 139 miles, or the equivalent of about two and one-half times the mileage between Reading and Philadelphia.

In order to care for our highway system, we have one of the largest fleets of equipment in the world. We have 632 automobiles, 1,340 trucks, 989 snow plows, 203 tractors, 223 rollers, 23 steam shovels, 11 truck cranes, 105 air compressors, and approximately $350,000 worth of small tools. The maintenance, operation of, and accounting for the equipment is no small job. We have three laboratories for testing materials used by the Department, one large central equipment repair unit, a Central Office, and 75 branch offices located in every county of the State. From the branch offices and plants the work of the Department is directly supervised.

While our personnel strength fluctuates with the seasons and

the amount of work, it is practically at its height now with approximately 33,500 hourly employees and 2,000 salaried employees on the Department's payrolls.

We obtain our funds mainly from the gasoline taxes, automobile licenses, operators' licenses, certificates of title and the Federal Government. At this point it will be well to tell you that every penny of Pennsylvania gasoline tax, motor licenses, etc., with interest, goes into highways. I make that statement because the money that is given by the Federal Government to Pennsylvania each year more than pays the cost of all collections, and all administration.

Our average monthly budget is about $5,000,000, but we have spent as much as $12,000,000 in one month and our biggest year was $80,000,000.

I have given you this picture of the size and scope of our organization so you will understand that our problems of control and management are similar to those confronting the largest businesses of the world today. It is akin to a corporation with many branch offices and plants, a large fleet of equipment, a large personnel, and ramifications of its administrative functions as many and varied as those of most commercial concerns of international importance.

Fiscal Control:

The success of fiscal control of any organization lies in the requirement that the controller must be a party to every record and every act affecting finances. Unless this is a procedure from which there is no variation, there is no assurance of control. Getting a record of nothing more than what has been done or of a document executed by the organization's officers, is not sufficient. When officials sign financial documents without the prior approval of the controller effective control is lost.

I know from experience that unless the controller is a party to the action that he has no real assurance of obtaining the necessary information to keep the proper fiscal control. Officials may sign important financial documents with every good intention that the controller's office shall be notified, but the controller's office may not be notified and unless you are lucky enough to find all such oversights, trouble results. The only effective safeguard

that we have found is for the controller to be a party to the execution of every financial document.

One of the safeguards or controls we use is in connection with advertising projects. Before we are permitted to receive bids we are compelled to advertise the projects over a certain period and in certain newspapers. Naturally, we do not want work advertised for receiving competitive bids from contractors unless we are sure there are sufficient finances to pay the bills when they become due. To avoid this we use an advertising form which must be approved by the controller before an advertisement can be run.

On our agreements affecting either the collection or disbursement of money, the controller is a party to the signing of the agreement which becomes void unless signed by the controller. This rule is conspicuously inserted on the forms.

For the guide of the controller in keeping control, we have a budget. We perform many functions, therefore we have a functional budget and control. Every function consists of a multiplicity of jobs of the same class, so the job is merely a subdivision of the functional budget. Control of our job expenditures lies in the rule that no work of any kind can be performed unless previously authorized in writing by the controller. Everything we do, whether it is to build a concrete highway, remove snow, maintain a highway, operate equipment, or run an office, is considered a job. Every job is budgeted and a reserve similar to a bank account is set up to finance it. When we authorize the job to be performed (which is always in writing) it becomes the charge against a budget classification. The controller's office sets up a job account and the branch office under whose jurisdiction the work is to be performed likewise sets up a simple ledger account. The only difference between the common checking account of a bank and these job accounts is that a bank credits the deposits and charges the checks drawn against it, while we credit the job with the amount of the authorization and charge the payrolls, material bills, equipment costs, etc., as they are incurred. The branch office, however, is required to set up necessary reserves against this account to finance materials, etc., as they are ordered so that they will know the uncontracted balance, as well as the unexpended balance.

No more money can be used for any job than that which is authorized, and as a safeguard against overdraft, we provide for the issuance of a stop payment notice which goes to every part of the organization through which any additional cost or expenditures might be approved.

As a control on the job the foreman responsible for each project is required to keep a daily accumulative record of the costs and amount of work performed and compare the actual costs with the preliminary estimates, sending daily reports to the branch offices for cost and progress reports. This means that the costs are controlled at the source each day.

While time will not permit consideration of details, let us follow a payroll through our organization to show you how the different accounts of the Central Office are kept in balance with the ledger account of the branch office. Our payrolls are prepared by the foreman on the job and they show what each man earns and what each man is doing each day. The information of what he is doing and the project on which he is working is shown in code.

The foreman sends his payrolls to the branch office where they are frequently summarized with payrolls of other foremen and the amounts chargeable to each job set forth on the payroll. The payrolls are then charged to the ledger account and forwarded to the Central Office for auditing and payment.

Upon receipt of the payroll in the Central Office it is first checked by the code clerks to determine that the work was authorized and that the code information is consistent with the work being performed. It is then audited and vouchered for payment. As soon as it is vouchered it is forwarded to our job cost control bookkeepers and each job is charged with the amount shown on the payroll. Copies of the payroll are then forwarded to the fiscal officers who draw the checks. At the same time our copy is forwarded to the tabulating organization where tabulating cost cards are punched and verified. From this voucher the tabulating organization furnishes the general control bookkeeper with the amounts to be entered in each of the ten general control accounts. While we have only ten general control ledger accounts, we have sixty-seven functional accounts. Sub-divisions of the major control accounts and the details for these accounts are furnished to

the bookkeeper at the close of each month's business for the preparation of our monthly financial statement.

Every kind of accounting document whether it is a payroll, material bill, an expense account, or some other class of document, goes through the same channels and is handled in the same manner so that, after all, it is quite simple. Now, in order to bring all our records into agreement at the close of each month, we obtain a detailed statement from the tabulating organization which shows all charges made against each job by each branch office during the month.

The first operation is to forward these statements to the job cost control bookkeepers who check the total charges incurred against each job during the month. This check is necessary in order to be sure that the charges were entered against the proper job by the job cost control bookkeepers. When the two records agree we are reasonably sure that they are accurate, and we want them to be accurate before the statement is furnished to the field offices for checking with their ledger accounts. This insures us that the tabulating organization, the job cost control bookkeepers' records and the branch office records are in agreement. In order to tie these accounts into the general ledger, we run a trial balance on the job cost control accounts which must tie in by function with the control books and financial statements. Every branch office must furnish a report after checking this statement with their ledger accounts. The report must either show that all items are in agreement or notify us of any discrepancies and such cases are immediately adjusted. That will give you a general idea of how the different parts of the organization are kept in balance and how our accounts are checked in general without going into the details of our accounting and cost system. I want you to understand, however, that the tabulating organization assembles all of our financial cost and statistical statements and furnishes all control figures to the general control bookkeeper, in addition to many other functions which it performs. It now functions beyond our original wildest dreams and I dare say operates about as efficiently as any tabulating organization in the country. We have no profit and loss accounts, therefore we must be in balance to the penny always.

To control an organization of this kind it is necessary to have

standard rules, regulations and procedure. This we accomplish by a loose leaf book of instructions which we call our Field Office Manual. The moment that any change is made in our procedure, a revised, dated sheet replaces the corresponding sheet of the manual, thereby always keeping the instructions up to date. Occasionally, we desire to make changes in procedure to become effective at some future date. In these cases we issue revised sheets, but indicate that they are not effective until a future date. This plan gives the branch offices sufficient time to study the changes and be prepared to make them effective.

But no system will work unless you have audits of all kinds. The psychological effect of anything being audited anywhere, any time, results in people being more careful because they have no idea when an auditor will appear on the scene. To care for this feature, we have traveling auditors whose duties and instructions are, "To audit and investigate anything connected with the Department of Highways, any place, any time, and to submit impartial complete reports of all of their findings."

Features of Office Management:

No doubt your experience in dealing with clerical help is somewhat similar to mine. Unfortunately, I have found a very small percentage of personnel with constructive ideas pertaining to their work. It seems that some of our best clerks get into such a rut that they think the only way of doing a thing is to continue the present method. As a result of this general attitude, we get only a small percentage of the suggestions for improvement from our clerks, even though we frequently ask for suggestions and criticism and do everything in our power to reward employes for good suggestions. Many of our suggestions for improvement of our personnel and procedure come from a report of errors that is furnished by the tabulating organization. We list every error that is discovered in our accounting organization. We show who made the error and what the error was. From this report of errors we can easily determine the weak spots in our personnel and procedure and take immediate steps to correct them. Besides, we display in each organization a report of errors chargeable to each employe and we have found it a wonderful incentive to accuracy because employes are striving for accuracy and we can help

them by showing them where their errors are made and how to prevent them.

In addition to reports of errors, we get reports of production which show the work performed by each employe each day and from this report we are enabled to set up standards of performance in many parts of our organization. I want to take time to mention a recent example of the result of setting up standards for key punch operators. A comparatively new employe reached the point of 68 per cent of our standard and then started dropping back. The employe was informed what would be required and what would happen if the production did not increase. As a result, her next month's work showed that that employe had not only increased her production from 68 per cent to 93 per cent, but had reduced her percentage of errors. So, while, I am not ready to say that it is possible to set up measurable standards in all lines of clerical work, there are certainly many fields that lend themselves well to standards and production studies, and there is no question but that greater economy and efficiency results.

We endeavor to complete each day's work within the day and on our production records we show the balance of work on hand at the beginning of the day, the work received during the day, the amount of work performed and by whom, and the balance of unfinished work at the close of the day. Get an organization interested in their own good record, congratulate them occasionally on what they are doing and watch your production increase.

The part of our organization responsible for the checking of payrolls and sending out checks to our employes for a period of almost five years had the enviable record of not permitting a check or a payroll to remain in their office overnight and it wasn't necessary to ask them to work overtime to finish their work. They had come to the point where they were extremely proud of their record and they wouldn't permit it to be spoiled. Certainly it is not possible to complete all work of all kinds throughout your organization each day, but certainly the most important work should be completed. In some parts of our organization in order to give the employes a goal to shoot at, we have not considered work received during the last half hour as applying to that day's business. On the other hand, it was considered as being received the next day. This has worked out splendidly in our organization

and if you haven't tried it, I would recommend that you give it a trial.

It might be of interest to know how it is possible to keep a standard flow of work through such a large organization. This is accomplished, for example, with our payrolls by having pay periods ending not only on the fifteenth and last of each month, but on twelve different days during the month. That is, our different branch offices have different designated pay periods endings and this results in a constant regular flow of work through the Central Office payroll organization. We use the same system in other kinds of work where it is possible.

I am often asked what kind of equipment, such as adding machines and calculating machines we use. The kind of equipment that we use depends entirely upon the class of work to be performed. Every type of machine has its place in business. The job is to find the piece of equipment that will do the job most efficiently. Each machine has its field and we install the machines to fit the job and do not try to make the job fit the machine.

I have frequently been asked if I am an advocate of the centralization of stenographic, typing and reproduction services of a large organization. My answer is this. For reproduction services, such as mutigraphing, mimeographing, and other types of reproduction, absolutely yes. For stenographic and typing service, only partially. I am a believer in giving responsibility and holding the employe responsible. Divide the responsibility and your control and interest are lost. I believe that where the full time services of stenographers and typists are necessary in any one part of an organization that that organization should be furnished such employes and made responsible for the results. Where full time employes are not necessary, then any service necessary should be furnished from a central service unit. The central service unit also has a use in furnishing replacements to other parts of the organization in the case of sickness, vacation, etc.

I think you will be surprised to know that our organization keeps the equivalent of a time clock record on all office employes. We keep a record of all time lost and overtime worked in minutes. As an incentive to regular attendance, we endeavor as nearly as possible to give time off without charging it to vacation for all

overtime worked, after first deducting from the total overtime all lost time, except sick leave of more than one day's duration. I think this scheme is absolutely fair to the employes. I believe it is the nearest approach to a fair break that either the management or an employe could expect.

We endeavor to grant vacations when the employes desire them, giving senior employes first choice. We prepare our vacation schedules in January or February, and scatter them throughout the year for the employes in each organization on each particular line of work so that it does not necessitate the hiring of temporary help to replace employes when on vacation.

A feature of office management that I am very strong for is to follow rules, regulations, procedure, etc., in chart form. By making a careful study of requirements it is wonderful how much information can be worked on a small sheet in chart form which otherwise would take pages and pages of manuscript to explain and then would not be clear. I have found that our branch offices actually use every chart that we furnish instead of manuscript; and the chart is always some place in front of them for handy reference. One example I recall that was rather difficult that worked out very satisfactorily was in connection with our purchasing procedure. Because of our laws and certain requirements, our purchasing is very complicated. To purchase one thing might be regular and lawful. To purchase another would be unlawful and we would experience great difficulty in making payment. So, we finally prepared a purchasing procedure chart which is our guide in making every kind of purchase. This purchasing procedure has been prepared in simple chart form on one sheet 11x17 inches and it really tells you more about how to acquire materials, tools, etc., than we were previously capable of explaining in manuscript form in a good sized manual. I am not strong for high-powered complex charts, but I am very strong for simple charts that can be understood by all of our employes with very little study, and I feel confident that you would help your personnel wonderfully if you would give real study to the preparation of chart procedure and eliminate a lot of your detailed rules of procedure.

It is surprising the economies and efficiency that you can effect by a study of your forms. We control our forms by having them

all approved by the employes who use them and final approval by the controller. Just recently we made a study of some of our forms and adopted a new form size 8½ x 11 inches that replaced twelve different forms, most of which were 11 x 17 inches and there is no question but that the new system is considerably more efficient than the old. I find some organizations are strongly specifying pen ruling on forms when printed brass ruling is just as effective and more economical. We have also found real saving in electrotype plates of complicated form set-ups instead of paying for subsequent set-ups.

I stand for neatness in our offices and in our records. It is often remarkable the improvement in appearance and even in working conditions that can be made by rearrangement of your office furniture. You can even systematize and standardize on janitor service. I could go on and on, but after all, office management is just the consistent grouping for better things, for better ways of doing things, for greater efficiency and economy. It is just that never-ending application of common sense toward the simplification and improvement of our business practices.

FLEXIBILITY IN BUDGETARY CONTROL

By A. C. Brett, Controller,
Hood Rubber Co., Inc., Watertown, Mass.

IT IS the purpose of this article to discuss briefly the limitations of the usual budget system, to point out its inflexibility when used as a criterion for judging operating results which have been obtained under varying conditions and to suggest an improvement. The ideas which are advanced are not altogether original or entirely new, but it is hoped that they offer food for thought. Backed by proper managerial support and an intelligent interpretation, they should go a long way toward solving this difficult problem.

Budgeting is the process of establishing a system of predetermined standards for the purpose of operating control. The budget is a tool of management. This fact should not be lost sight of in any discussion concerning the principles which underlie budget making. Conclusions must not only be sound in theory but also practical in operation.

The ordinary method of setting up and operating a budget is fairly well understood. It is usual practice to establish first a dollar volume base and to build from this structure of detailed costs working at last to a final net profit. If this first result is not satisfactory it is revised until a set of figures is arrived at on the basis of which the management is willing to operate. It finally represents the result it is expected to obtain if a certain definite dollar volume is reached.

Those who have operated under such a budget realize its limitations. It is a definite measure under certain definite conditions which, however, never exist exactly as planned. It can serve only as a very rough guide.

In every comparison to be made between such a budget and the actual results obtained two variables must be taken into consideration. These may be called the volume variable and the operating variable. The first, or volume variable, is caused by the fact that the actual volume obtained always varies from the volume used as the basis for the budget. This causes a variation in every item of expense connected with the operations, but what this variation is and what the expenses should be under the exact volume realized, this method of budgeting does not disclose.

The second variable, or operating variable, is that which is to be measured by the application of the budget itself. It is the variation in expenses which occurs even when handling the same volume. These variations are due to differences in method, in management; to the efficiency or lack of efficiency in the operation of the unit itself.

It is impossible to make adequate comparisons under these circumstances. In order to do so some way of eliminating the effect of the volume variable must be found so that the results of operation may be compared directly with a correlated operating standard. The method to be discussed is designed to furnish a method of making such a direct comparison.

Under the usual method of budgeting after the volume factor is determined, the budget maker proceeds to estimate the operating expenses at this particular volume.

The case of a certain sales unit which handles a large volume of product direct to jobbers will furnish an example. The sales volume of this unit is first determined to be $1,000,000 per month at

list prices. The expenses for this unit at this volume and the resulting net profit are then estimated as shown by the following schedule:

List Sales	$1,000,000	100%
Cost of Merchandise	$750,000	75%
Trade Discounts	50,000	5%
Cash Discounts	10,000	1%
Sales Commissions	50,000	5%
Travelling Expenses	20,000	2%
Freight	20,000	2%
Bad Accounts	10,000	1%
Collection Expenses	10,000	1%
Sales Overhead	40,000	4%
Net Profit	$40,000	4%

If the sales happen to be exactly $1,000,000 per month, as estimated, it will be possible to make a direct comparison between the actual expenses and the budget figures and to determine where the variations occur; but, if the volume fluctuates, as it is sure to do, there is no method by which a direct comparison can be made between the actual expenses and the budget as set up.

Let us suppose in the case already cited that the sales volume has risen to $1,200,000 for the month under consideration and that the expenses present the following aspect. A comparison of the budget and the actual would then be as follows:

	Budget		*Actual*	
Sales	$1,000,000	100%	$1,200,000	100%
Cost of Merchandise	$750,000	75%	$900,000	75.00%
Trade Discount	50,000	5%	63,000	5.25%
Cash Discount	10,000	1%	15,000	1.25%
Sal. and Commissions	50,000	5%	58,000	4.83%
Travelling	20,000	2%	23,000	1.92%
Freight	20,000	2%	24,000	2.00%
Bad Accounts	10,000	1%	13,000	1.08%
Coll. Exp.	10,000	1%	14,000	1.17%
Overhead	40,000	4%	45,000	3.75%
Net Profit	$40,000	4%	$45,000	3.75%

By looking at this table of actual costs, we see that they have all risen so that the net operating profit for this division is only $5,000 more than that for the lower volume. The volume has increased 20%—the net earnings only 12½%. At the outset this does not seem to be a profitable increase in operations. Earnings have increased over the budget but not in proportion to the increase in sales volume and in addition to this the percentage of earnings to volume is only 3.75 against the budget figure of 4%.

In order to form an intelligent opinion as to what has happened, it is necessary to scrutinize each item and to form a judgment as to whether it is probably high or low, taking into consideration the sales volume obtained.

Taken as a whole the expense comparisons are indefinite and must be supplemented by considerable current analysis in order to arrive at final conclusions.

This illustrates pretty well the conditions which result with the ordinary fixed budget. The managers of the enterprise must be continually estimating. Every item must be considered individually in the light of the variation in volume and an independent appraisal made of its variation. Nothing is definite, variations are not scientifically determined, and results are the subject of continual speculation.

The reasons for this condition are not difficult to ascertain. Expenses differ in character. Some vary in the same ratio as sales volume. These might be called wholly variable. Others are not affected by volume at all or only in a slight degree—in other words, they are fixed or partly so. If it were possible to predetermine for a divisional unit the amounts of the fixed expenses and the rates of variation of the variable ones a means of direct comparison at any volume could be had.

The method of budget procedure which I will explain is designed by the use of these principles to do away with the uncertainty of comparison and the necessity for current analysis and to substitute for it a method of computing the exact budget figures for any volume. This method provides a means of direct comparison with the actual operating results obtained. *It eliminates the volume factor so far as current comparisons are concerned and makes it instead the subject of an entirely independent investigation.*

The basis of the method is the assumption that between two volume limits every element of expense may be divided into a fixed portion which will exist unchanged and a variable portion which will always exist in the same percentage relation to the volume base. I will not quarrel with the mathematicians who may contend that such is not an exact statement of fact. It is sufficient that this relationship is accurate enough to render it workable in the capacity in which I intend to use it.

The method of determining the fixed and variable factors in any budget problem may be stated briefly as follows: Two expense budgets are first set up by means of careful and detailed analysis, one for the maximum volume beyond which it is conceded the responsibility will not go and the other for the minimum which is lower than any point which will be reached. By the use of these two budgets each expense factor is split into two parts—one the fixed portion which does not vary for any volume between these two limits and the other variable portion which always bears the same percentage relation to the sales volume. I will illustrate by an example how this works out and also explain the derivation of what I will call the principle, which is used to establish these two expense elements.

A certain unit with a volume of $1,000,000 is estimated to have expenses of $500,000. If this volume falls to $600,000 the expenses are estimated to be $400,000. This shows a variation in volume of $400,000 against a variation in expense of $100,000. The expense variation, in other words, amounts to 25% of the volume variation. If this percentage of the minimum volume of $600,000 is taken, an amount of $150,000 is arrived at which represents the variable portion of the expense. This, subtracted from the total expense of $400,000, gives a fixed expense of $250,000.

Applying this same method of computation to the maximum volume, 25% of $1,000,000 or $250,000 as the variable amount is shown which, when subtracted from the total expense of $500,000, gives the same fixed amount as in the previous computation, or $250,000. This computation may be shown in tabular form as follows:

	Volume	*Expenses*
Maximum	$1,000,000	$500,000
Minimum	600,000	400,000
Variation	$400,000	$100,000

Variable 25.%

	Maximum	*Minimum*
Volume	$1,000,000	$600,000
Expenses	500,000	400,000
Variable 25%	250,000	150,000
Fixed Amount	$250,000	$250,000

Having established the principle to be used, it can be applied to the original example to work out for that unit the fixed and variable factors for each item of expense.

Suppose that operating limits for this unit are set at $1,500,000 as a maximum and $800,000 as a minimum. It is expected that the operations for the period will lie within this range. The next step is to make two estimates for each element of expense—one based on the maximum volume of $1,500,000 and the other based on the minimum of $800,000.

With these limits established the fixed amount and the variable percent can be computed for each expense element. The following shows the results obtained:

	Maximum	*Minimum*	*Fixed Amount*	*% Variable*
Sales Volume.	$1,500,000	$800,000		
Cost of Mdse.	1,125,000	600,000		75.00
Trade Disc. ..	79,500	40,000	—5,142	5.643
Cash Disc....	19,500	8,000	—5,144	1.643
Sal. & Com...	67,500	56,000	42,856	1.643
Travelling ...	22,500	22,500	22,500	
Freight	30,000	16,000		2.000
Bad Accounts.	15,000	8,000		1.000
Coll. Exp.....	15,000	8,000		1.000
Overhead	52,500	48,000	42,855	.643
	$1,426,500	$806,500	97,925	88.572
Net Earnings.	73,500	—6,500		

From this estimate it is seen that the total fixed expense for this volume range is $97,925 and the total variable 88.57%. It is apparent also that the volume must be more than minimum of $800,000 in order to prevent a loss.

A further study of the figures will reveal the fact that if the variable expenses are 88.57%, in order to break even the fixed expense must equal the difference, or 11.43%. By using these figures the 'break even" volume can be computed as $857,000.

In order to be of value such budget estimates must be carefully made, using previous comparative figures, all available statistical data and careful business forecasts. They should be set at as nearly as possible the expected results under the conditions which will exist and should not reflect desired or ideal conditions. In other words, the budget should be probable and possible rather than ideal.

In the example given above it is assumed that each one of the expense elements has been carefully analyzed and figures made on the basis of both the maximum and the minimum volumes.

Cost of merchandise will usually be entirely variable. It might happen in some types of business that an increased volume would lead to economies in purchasing or the securing of more favorable discounts.

If this were the case this item of expense would be shown by analysis to be partly fixed and partly variable. In the example shown, it is wholly variable at 75% of the sales volume. If the estimates showed that merchandise could be purchased on a 75% basis for a volume of $800,000 and on a 72% basis for a volume of $1,500,000, the figuration would be as follows:

Maximum Volume	$1,500,000	Maximum Cost	$1,080,000	72%	
Minimum Volume	800,000	Minimum Cost	600,000	75%	
Variation in Vol.	700,000	Variation Cost	480,000	.6857%	Variable
Maximum Cost	$1,080,000	Minimum Cost	$ 600,000		
Variable	1,028,550	Variable	548,550	.6857%	Variable
Fixed Amount	51,450	Fixed Amount	51,450		

The second item—Trade Discount—shows an increase in actual percentage to volume from 1. to 1.3, from minimum to the maximum. This is due to the fact that in order to broaden the market, it will be necessary to include a class of customers, perhaps large mail order houses or department stores, which buy in large quantities and command a larger discount.

By applying the formula it is found that the variable percentage is 5.643 but that the fixed amount instead of being a positive is a negative figure and subtracts from the variable amount. This is due to the fact that the expense increases rather than diminishes in relation to sales as volume increases.

Passing to the next item, it is found that the same condition exists. The class of customers to which it has been necessary to go to expand the business evidently discount their bills to a greater extent than the usual run of customers. This gives also a variable percentage and a negative fixed amount.

Salaries and Commissions grouped in one item include the commission of salesmen on a straight percentage of sales basis as well as the fixed salaries of sales managers, house salesmen, etc. This item varies in actual percentage to sales of 7% at the lower limit to 4.5 at the maximum. An application of the formula shown below gives a fixed amount of $42,856 and a variable percentage of 1.643.

Maximum Volume	$1,500,000	Comm. on Max. Vol...	$67,500	4.5%
Minimum Volume	800,000	Comm. on Min. Vol...	56,000	7.0%
Variation in Volume..	700,000	Variation	11,500	1.643 Variable %
Comm. on Max. Vol..	67,500	Comm. on Min. Vol...	56,000	Total Est. Exp.
Variable Amount	24,644	Variable Amount	13,144	Variable 1.643%
Fixed Amount	42,856	Fixed Amount	42,856	Fixed Amount

The next item—"Travelling Expense"—is an example of an item which in the example used is entirely fixed. Probably this would not be entirely true, although it would usually approach this condition under a careful detailed sales supervision.

As the opposite of this condition, the item of Freight would probably be entirely variable as the average cost of distributing a unit of merchandise in a given territory is usually the same whatever the volume.

The items of Bad Debts and Collection Expense are, under ordinary conditions wholly variable. Overhead is almost wholly fixed, showing only .643 of one percent variable.

Having established the budget basis, a comparison can now be made between the estimated and the actual expense at any sales volume. This would be done as shown in the following example.

Suppose that the first month's operation shows an actual volume of $1,200,000 with expenses as shown previously. The next step is to compute the budget items on the basis of this volume

and compare these amounts with the actual to get a true picture of the results of our operations. The following schedule shows the method of making this comparison.

This operating report shows the results of actual operating cost compared with a standard operating cost for the same sales vol-

OPERATING REPORT

Range Max..... $1,500,000
Range Min..... 800,000
B. E. Vol..... 857,000
Organization Unit-Manager Div. A. Sales
Sales this month..... $1,200,000 Month of January, 1926

Items	BUDGET Fixed Amount	Variable %	Variable Amount	Standard Cost	Actual Cost	Loss	Gain
Cost of Mdse....	.....	75.	900,000	900,000	900,000	.....	.....
Trade Disc.....	$,142	*5.643	67,716	62,574	63,000	426	.....
Cash Disc.....	$,144	*1.643	19,716	14,572	15,000	428	.....
Sal. & Com.....	42,856	1.643	19,716	62,572	58,000	.....	4,572
Traveling	22,500	.....	.....	22,500	23,000	500	.....
Freight	.....	2,000	24,000	24,000	24,000	.....	.....
Bad Accts.....	.....	1.000	12,000	12,000	13,000	1,000	.....
Coll. Exp.	.....	1.000	12,000	12,000	14,000	2,000	.....
Overhead	42,855	.643	7,716	50,571	45,000	.....	5,571
Total	97,925	88.572	1,062,864	1,160,789	1,155,000	4,354	10,143
Net Earnings....				39,211			5,789

* Red.

ume. A glance at the last two columns shows the variations which have taken place. There is no necessity to take into consideration the volume attained or to view the operating figures with a mental interpolation based on the fact that the budget has been exceeded or has not been reached. The effects of the variation in volume have all been eliminated in the method of figuring the standard cost. In other words, the standards are already adjusted to the variation in volume and a direct comparison between these standard figures and those representing the actual results of operation can be made.

The example just cited shows the method of handling the budget for a sales unit probably selling one commodity to jobbers. The budget for the business as a whole can be thought of as simply a collection of similar budgets each representing the responsibility of some operator. If the problem were a manufacturing enterprise, similar budgets would be made up covering the production end of the business.

By-Products of the Flexible Budget

A knowledge of the fixed and variable elements of expense for

any part and for the whole of the business makes possible the answering of a number of questions which are almost impossible of solution except by this method.

One of the most common of these is this. At what point will the profit change to a loss with any further reduction in volume? I have called this the *break-even volume*. It is evident that at this point the fixed costs amount is equal to the difference between 100 and the variable percentage. In the example, to repeat for the purposes of illustration, our variable percentage is 88.57 of list sales. This leaves 11.43% to cover fixed expenses and profit.

At the break-even volume there is neither profit nor loss, so the fixed expenses must equal exactly 11.43% of list sales. If the fixed amount is, therefore, $97,925 the break-even volume must be $857,000.

An adaptation of this is in finding an answer to the question which often arises as to whether it is profitable to take on additional business at an increased discount. In the problem cited the question might be asked as to whether an additional $200,000 of business at a 10% discount would be profitable.

At any volume between the maximum and the minimum limits there remains 11.43% of the actual list volume to cover fixed expenses and profit. At a volume of $1,057,000, therefore, $120,815 must cover a fixed expense of $97,925, leaving a margin of $22,890. Figured as a percentage of the increase, 11.44% of the additional $200,000 can be given away as discount or other expenses and still the unit will break even.

For want of a better term, I will call the percentage difference between 100 and the variable percentage the "margin for fixed." The amount by which this, at any volume, exceeds the fixed amount is, of course, the profit.

Another question which this method of budgeting can be made to answer is this. Is the business properly balanced to weather an adverse business storm or to profit most from favorable conditions? We often hear the statement made that a certain business is in difficulties because it has too large a fixed overhead. Usually these statements are based more on conjecture than on a basis of accurate figuring.

I will use as an illustrative example three businesses, all making the same net profit on the basis of $1,000,000 volume, but each

having a different relation between fixed and variable expense—in other words, a different *margin for fixed.*

It can be seen from this that business No. 1 will show a profit increase of only $40,000 at the increased volume, but will, on the other hand, still show a profit at the lower volume. Whereas, business No. 3 will show a profit increase of $80,000 at the increased volume, twice as much as business No. 1, but will show a loss of $30,000 at the decreased volume.

	No. 1		*No. 2*		*No. 3*
Volume	$1,000,000		$1,000,000		$1,000,000
Variable 80%	800,000	70%	700,000	60%	600,000
Fixed Amount..	150,000		250,000		350,000
Net Profits.....	50,000		50,000		50,000
Volume	$1,200,000		$1,200,000		$1,200,000
Variable 80%	960,000	70%	840,000	60%	720,000
Fixed Amount..	150,000		250,000		350,000
Net Profits.....	90,000		110,000		130,000
Volume	$ 800,000		$ 800,000		$ 800,000
Variable 80%	640,000	70%	560,000	60%	480,000
Fixed Amount..	150,000		250,000		350,000
Net Profits.....	10,000		—10,000		—30,000

The principle covering this may be stated as follows. The larger the ratio of fixed to variable expenses, the larger will be the increase in earnings with an increase in volume, but the larger the loss in case of a decrease in volume. The converse will also be true—the smaller the ratio of fixed to variable expenses, the smaller will be the increase in earnings with an increase in volume, and the smaller will be the decrease in earnings (or loss) with a decrease in volume.

Budgeting has been offered as a panacea for nearly all business ills. It is not that, but in some form or other budgeting is now recognized as an indispensable part of all business organization. Where budgetary procedure has failed, its failure has usually been due to its inflexibility as a tool of management. Any plan which

constitutes a workable method of doing away with this inflexibility makes an important addition to the value of the budget as a tool of management. It is hoped that the foregoing suggestion may be a step in this direction.

ACCOUNTING FOR LOSS ON IMPERFECTS

By Lloyd F. Mogel, Cost Accountant,
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IN THE course of manufacturing certain defective products are made. These defects may be caused either by defects in the manufacturing process or defects in the raw materials. In some industries, particularly the hosiery industry, variation in grade of the raw material is of major importance, and is responsible for the majority of imperfects. The defective merchandise has a reduced selling value ranging from a slight reduction from first quality to waste or scrap value.

As the first quality merchandise is the profit producing product it is essential to know how much must be allowed or added to the cost to take care of losses due to imperfect qualities. This is a very important element of cost in fine grade silk hosiery, especially so at the present time when so much inferior silk is unloaded on the market.

The cost of manufacturing imperfect merchandise is the same as for first quality, and in some cases it costs considerably more. The products, regardless of quality, pass through identical operations and are finally graded at the end of the productive operations. At this grading or inspection, reports are made to show quantities of each quality in a particular lot. In the full fashioned hosiery industry, there are the grades of "Imperfects" "Seconds" "Thirds" "Fourths" "Rags."

We shall describe the method of accounting for this "Loss on Imperfects" in our plant. We have "actual costs" in our accounting system which are developed from standards. Actual and standard are both carried side by side in our factory ledger. This discussion is therefore based on the accounting for this system. First, we wish to call attention to the elements of the cost of a hypo-

thetical style No. 248, as shown in Fig. 1. You will see that "Loss on Imperfects" is quite important.

FIGURE 1

(Cost Sheet Style No. 248)

	Actual	*Standard*
Material	$ 3.73	$ 3.55
Dyeing	.22	.24
Labor	2.48	2.55
Burden	1.90	1.75
	$ 8.33	$ 8.09
Loss on Imperfects	1.40	.64
	$ 9.73	$ 8.73
Packing Costs	.33	.35
Delivery, Selling & Gen. Administrative	1.50	1.02
	$11.56	$10.10
Selling Price	$11.00	

In Fig. 2 we show the relative market values of each grade of hose and the method of determining the standard inventory value of the stock of imperfect merchandise. The actual inventory value is derived from current selling prices less commercial expenses.

FIGURE 2

(Standard Inventory Value of Imperfects No. 248)

	Imperfects	*Seconds*	*Thirds*	*Fourths*
Standard Market Value	$7.00	$5.00	$3.50	$2.50
" Commercial Exp.	.82	.72	.41	.35
	$6.18	$4.28	$3.09	$2.15
" Packing Costs	.20	.20	.15	.15
" Inventory Value	$5.98	$4.08	$2.94	$2.00

Fig. 3 shows the calculation of the "Standard Loss in Imperfects" for Standard Costs. The standard % of each grade is determined from past experience or tests, or is based on the expec-

tations of the management. The "Loss in Value" represents the write down from standard cost to standard inventory value. The total loss must be borne by the first quality merchandise which is therefore divided by the % of firsts to ascertain the "Loss" per dozen applicable to first quality. This calculation is for Standard Cost and is made only once when the standard is set-up.

FIGURE 3

(Calculation of Standard "Loss on Imperfects")

17.00% Imperfects	@	$2.11	Loss in Value	=	.359
2.30% Seconds	@	4.01	" " "	=	.092
.16% Thirds	@	5.15	" " "	=	.008
.20% Fourths	@	6.09	" " "	=	.012
.23% Rags	@	8.09	" " "	=	.019
.20% Leg Waste	@	4.50	" " "	=	.009
.13% Examiner Waste	@	7.25	" " "	=	.009
20.22%		TOTAL			.508

.508 Loss ÷ 79.78% firsts = .637 Loss per dozen of firsts.

There are three causes for variation from "Standard." 1. Actual manufacturing costs; 2. Quantity of Imperfects; 3. Selling or Market price of Imperfects. In order to know the actual "Loss on Imperfects" it is necessary to consider these three elements in our accounting procedure.

Fig. 4 shows the Work in Process account for this style No. 248, divided as to elements of cost. This could be a product class consisting of a group of styles. The procedure is the same. Entry A, is the result of current manufacturing operations. Entry B relieves the Work in Process of the cost of Imperfects and setting

FIGURE 4

(Work in Process "Factory Ledger" Style No. 248)

	Material		*Dyeing*		*Labor*	
	Actual	*Stand.*	*Actual*	*Stand.*	*Actual*	*Stand.*
"A"	$3,730.00	$3,550.00	$220.00	$240.00	$2,480.00	$2,550.00
"B"	*1,252.15	*1,192.52	*71.16	*77.35	*806.59	*831.54

	Burden		*Loss on Imps.*		*Total*	
	Actual	*Stand.*	*Actual*	*Stand.*	*Actual*	*Stand.*
"A"	$1,900.00	$1,750.00	$.....	$.....	$8,500.00	$8,090.00
"B"	*621.82	*570.48	951.15	433.92	*1,800.57	*2,237.97

* Red Figures.

up the "Loss on Imperfects" in the inventory or adding it to the cost of first quality. The imperfect stock is carried in another account.

Fig. 5 shows the Imperfect Stock account for style No. 248. Entry B is the "Inventory Value" of Imperfect merchandise taken out of Work in Process.

FIGURE 5

	Actual	*Standard.*
Inventory beginning of month	$1,485.00	$1,500.00
"B"	1,800.57	1,888.07
Inventory before shipments are entered	$3,285.57	$3,388.07

Fig. 6 shows the work sheet supporting Entry B on Fig. 4 and 5. The debit to "Imperfect Stock" is calculated by extending the dozens produced of each quality by the actual inventory value and the standard inventory value. The actual inventory value is the current selling price less normal commercial expenses. The credit to Work in Process is calculated by extending total dozens of all qualities below firsts by the unit standard cost to obtain the standard value. The ratios of actual to standard are applied to the standard value to get the actual value. The predetermined standard loss equals dozens of firsts times the standard loss per dozen.

FIGURE 6

(Work Sheet to Calculate Actual Loss on Imperfects)

		Actual Inventory Value		*Stand. Inventory Value*
Imperfects	277.0 Dozens x ($6.75 Sel. Pr. — .82 Exp.)	$1,642.66	@ $6.18	$1,711.86
Seconds	38.0 " x (4.50 " " — .72 ")	143.64	@ 4.28	162.64
Thirds	3.0 " x (3.75 " " — .41 ")	10.02	@ 3.09	9.27
Fourths	2.0 " x (2.50 " " — .35 ")	4.30	@ 2.15	4.30
	322.3	$1,800.57		$1,888.07

Dr. to "Imperfect Stock"

Cr. to "Work in Process"	*Materials*	*Dyeing*	*Labor*	*Burden*	*Total*
Standard Cost	$1,192.52	$77.35	$831.54	$570.48	$2,671.89
Ratios	105	92	97	109	.....
Actual Cost	$1,252.15	$71.16	$806.59	$621.82	$2,751.72

Dr. to "Work in Process"
Predetermined Standard Loss—678 dozens Firsts x $0.64 Standard Loss—$433.92 Standard Loss

Dr. to "Work in Process"
(Total Cr. to W. in P. $2,751.72 less Total Dr. to Imp. Stock $1,800.57)—$951.15

The "Loss on Imperfects" appears on the Profit and Loss Statement in the Cost of Sales, thereby making possible a profit and loss statement by class of products or styles.

The only "Loss on Imperfects" not provided for is the drop in market value of the goods in the "Imperfect Inventory" from the present month to the succeeding month. Also excess commercial expenses applied to a low volume of sales or shipments.

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